BOTANY

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Souter's New Series of Catechisms.

R. & L. Williamson. Sculp.

Engraved for D.r Irving's Botany.

SOUTER'S NEW SERIES OF CATECHISMS.

A

CATECHISM

OF

BOTANY:

CONTAINING

A DESCRIPTION OF SOME OF THE MOST FAMILIAR

AND

INTERESTING PLANTS,

ARRANGED ACCORDING TO THE LINNÆAN SYSTEM.

WITH

AN APPENDIX

ON THE FORMATION OF AN HERBARIUM

BY C. IRVING, LL.D. F.S.A. &c.

A NEW EDITION,

CORRECTED AND IMPROVED.

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LATE SOUTER AND LAW.

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EXPLANATION OF THE PLATE.

THE top row of figures represent the different parts of a cruciform flower: *a*, the perfect flower; *b*, the stamens and receptacle; *f*, a separate anther, magnified; *g*, a pistil; *c*, the seed-vessel open, with seeds; *d*, the calyx; *e*, the petals. In figure 17 we have shown the nine combined and one separate stamen of a papilionaceous flower; and in the 19th, a floret of the centre, (commonly termed a tubular floret;) and a ligular or marginal floret of the daisy.

1. A flower of the *Hippuris Vulgaris*—Common Mare's tail.
2. *Veronica Beccabunga*—Brooklime Speedwell.
3. *Valeriana Officinalis*—Great wild Valerian.
4. *Ilex Aquifolium*—Common Holly.
5. *Verbascrum Nigrum*—Black Mullein.
6. *Lilium Candidum*—Common White Lily.
7. *Æsculus Hippocastanum*—Horse Chesnut.
8. *Chlora Perfoliata*—Yellow Wort.

In the eighth figure of our plate, the Yellow Centaury is represented in mistake for the *Chlora Perfoliata*, Yellow-wort, sometimes familiarly called Yellow Centaury. The 19th class has now two examples; and the proper figure for the eighth, is here given in addition.

9. A flower of the *Butomus Umbellatus*—Flowering-rush.
10. *Dianthus Deltoides*—Maiden Pink.
11. *Sempervivum Tectorum*—Common Houseleek.
12. *Rosa Canina*—Common Dog Rose.
13. *Papaver Rhœas*—Common Red Poppy.
14. *Lamium*—Dead Nettle (Corolla of).
15. *Cheiranthus Fruticulosus*—Common Wild Wall-flower.
16. *Geranium Columbinum*—Dove's-foot Geranium.
17. *Lathyrus Odoratus*—Sweet Pea.
18. *Hypericum Androsæmum*—Tutsan.
19. *Bellis Perennis*—Common Daisy.
20. *Orchis Mascula*—Early Purple-orchis.
21. Catkins of the Birch, *Betula Alba*.
22. Catkins of the Willow, *Salix Alba*.
23. Three flowers (magnified) of the *Atriplex Patula*—Halberd-leaved Orache; one perfect, one with stamens only, and the other with a pistil only.
24. (1.) A mushroom. (2.) Moss. (3.) Lichen. (4.) Sea-weed.

A

CATECHISM

OF

BOTANY.

CHAPTER I.

INTRODUCTION.

Q. WHAT is Botany?

A. Botany is the science which teaches us the knowledge of plants or vegetables, the arrangement of their several sorts, and their various qualities.

Q. What advantages are derived from the study of botany?

A. The study of this science as an amusement is both healthy and pleasing, as it attracts us often into the country, and makes us acquainted with the wonderful works of nature: it also enlarges the mind by implanting new and useful ideas, and fills it with the most exalted admiration of the great Creator of the Universe.

Q. What productions of nature are comprehended in the appellation of plants or vegetables?

A. Plants, or vegetables, are bodies supported by air and food, endowed with life, and subject to death, but incapable of voluntary motion.

Q. What number of plants is at present known?

A. Botanists have discovered upwards of 40,000 different species of plants; of which about 4,000 are *indigenous*, or natives of England; all the rest are *exotic*, or introduced from foreign parts.

CHAPTER II.

OF THE ROOT.

Q. What are the different parts of a plant?

A. A perfect plant consists of the root, the trunk or stem, the stalks, the leaves, the flower, and the fruit.

Q. What are the functions of the root?

A. The root serves to fix the plant, and to imbibe nourishment from the earth for its support.

Q. What names are given to it according to its duration?

A. Roots are either *annual*, lasting only one year; *biennial*, when produced in one year, and flowering the next; or *perennial*, when they last many years.

Q. Of what does the root consist?

A. The root generally consists of two parts, the body, and the fibres; the latter is the part which imbibes nourishment, and as its powers are dormant during the winter, that season is most proper for transplantation.

Q. Are there not different sorts of roots?

A. There are six principal varieties of roots, chiefly distinguished by their form: 1st, the fibrous root, which consists of a number of fibrous radicles, each more slender than the base of the trunk, or stem, from which it proceeds. 2d, the spindle-shaped root, which gradually tapers down-

wards, and produces a number of fibrous radicles from its surface. 3d, the tuberous root, which consists of a number of solid knobs, usually thicker than the base of the stems, collected into a loose bunch by slender strings, and emitting fibrous radicles from every part. 4th, the bitten root, which ends abruptly, as though a part of it had been bitten off. 5th, the granulate root which has many little fleshy knobs connected together by the fibrous radicles. 6th, the bulbous root, which is a roundish body, emitting fibrous radicles from its base only.

CHAPTER III.

THE STRUCTURE OF PLANTS.

Q. What is the trunk, or stem?

A. The trunk, or stem, is that part of a plant which supports the leaves and flowers.

Q. Of what parts is it composed?

A. Of the pith, the wood, the alburnum, the bark, of which the inner part is called the *liber* and the outer the *cortex*, and the cuticle, which is the thin exterior covering, answering to the skin of animals.

Q. What are the nature and functions of the pith?

A. The pith is a tolerably firm juicy substance which is diffused through the plant, to give energy and vigour to the whole; it is most abundant in young plants, diminishes as they grow up, and at length totally disappears.

Q. How is the wood formed?

A. The wood is a compact fibrous substance,

formed by new layers which are added every year from the innermost part of the bark, so that the age of a tree or shrub may be ascertained by the number of ligneous circles which appear upon cutting the stem close to the root.

Q. What is the alburnum?

A. The alburnum is the young wood, which in the first year is softer and whiter than the old wood: it is sometimes called the sap-wood, being the part in which the sap chiefly resides.

Q. What is the bark?

A. The bark is supposed to be formed by the intertexture of a number of fibrous stems, proceeding from the leaf-buds to the earth, and connecting them with the fibres of the root.

Q. What is the sap?

A. The sap is the fluid which nourishes the plant, and is as it were the blood from which the whole body derives life.

Q. By what means does it perform its functions?

A. The fluids destined to nourish the plant being absorbed by the root, and become sap, are carried up into the leaves and branches, in the spring, through the sap-vessels situated in the alburnum.

Q. Is the sap found in the trunk throughout the year?

A. It is supposed that a portion of sap remains in the tree at all seasons; but in the spring, when the absorbent vessels are put into action by returning warmth, an additional quantity is imbibed, and its motion is quickened.

CHAPTER IV.

THE BUDS, AND LEAVES.

Q. What is the bud?

A. The bud is that part of a plant which contains the future flower or shoot, wrapt up in scales, and protected from external injuries, till the season is fit for its expansion.

Q. How is it formed?

A. Buds are formed during the summer; and consist of small leaves, closely enveloping each other, and often protected against wet and cold by an external guard of a gummy, resinous, or woolly substance.

Q. What do you remark of the leaves?

A. The leaves, which differ much in the variety and elegance of their form, consist of an immense number of fibres or nerves, imbedded in a cellular pulp.

Q. How do they perform their functions?

A. The surface of the leaf being full of minute pores or holes, it imbibes the dew, air, &c. necessary for the growth of the plant;* it also exposes the sap, which it receives from the alburnum, to the action of the air, and returns it to the bark by its fibres or vessels.

Q. For what other purposes are the leaves designed?

A. Leaves serve to nourish and prepare the buds of the future shoots, which are always formed at the base of the leaf-stalk; and to shade them,

* It has been proved by experiments with the air-pump, that if leaves be deprived of air, the whole plant will die.

as well as the fruit, from the too powerful heat of the sun, which would dry up their moisture, and prevent them from coming to maturity.*

Q. What else is remarkable of leaves?

A. Leaves always turn towards the light; they also give out moisture: and it has been ascertained, that healthy vegetables perspire water, by the under surface of their leaves, equal to one-third part of their weight every twenty-four hours.

Q. Are there not many different kinds of leaves?

A. Botanists enumerate above a hundred distinctions of leaves, according to their position and form: their colour is almost universally green; but the upper and under surfaces frequently differ in hue, as well as in the kind or degree of roughness.

Q. What are the most common varieties of form in the leaf?

A. The egg shape, the lance shape, the oblong, the heart shape, the arrow shape, and the linear.

Q. Can you give me any examples?

A. The egg shape is exemplified in the leaf of the elder tree; spear mint has a lance-shaped leaf; that of common brooklime is oblong; the leaf of the sweet violet is heart-shaped; that of the little field convolvulus is arrow-shaped; and the leaves of grasses are mostly linear.

* In countries where there is almost perpetually a burning sun, most of the trees retain their leaves throughout the year.

CHAPTER V.

SECRETIONS, ODOUR, AND COLOUR OF PLANTS.

Q. What are the secreted fluids of plants?

A. Gum is a secretion which oozes from the plum, cherry, and other trees, in the form of large drops or lumps; resin and turpentine are of the same nature, as is also the milky juice of the fig, poppy, the yellow juice of the celandine, &c.

Q. From what does the smell of plants proceed?

A. The odour of plants is a volatile oil of a resinous nature, communicated to the surrounding atmosphere: some plants which have no smell during the day, smell powerfully in the evening; and the sweet smell of new hay is perceptible only when the grass begins to dry.

Q. How is the green colour of plants accounted for?

A. The green colour of vegetables is supposed to arise from the oil which they contain, acted upon by the rays of the sun: it is also owing to their exposure to light, as may be seen by the common practice of blanching celery by covering it from the light, and by plants raised in darkness, which are of a sickly white.

CHAPTER VI.

THE FLOWER, AND FRUIT.

Q. What is the flower?

A. The flower is that temporary and often beautiful part of a plant, which is destined for the formation, and perfection, of the fruit and seed.

Q. What are its principal parts?

A. The parts of a flower, called the parts of fructification, are seven; namely, the *calyx*, the *corolla*, the *stamens*, the *pistils*, the *pericarpium*, the *seed*, and the *receptacle*.

Q. What is the calyx?

A. The calyx or flower-cup, is the green part situated immediately under the blossom; as the green leaves of a rose bud. *See plate, fig.* 12.

Q. What is the corolla?

A. The corolla is the part of a flower which is commonly termed the blossom; it is mostly of a delicate texture, and coloured, (seldom green;) and is formed of one or more leaves, called petals.

Q. Is not the nectary a part of the corolla?

A. The nectary is that part of the flower which connects the collected honey; sometimes it lodges in the tube of the corolla, sometimes a cavity is formed for it on each of the petals; sometimes the nectary is separate from the petals, as in the larkspur, &c.

Q. What are the stamens?

A. A stamen is composed of two parts, the filament, and the anther; the anther is a little bag of coloured meal, the filament is the stalk which supports it. Stamens are generally affixed to the calyx, the corolla, or the receptacle; their number varies from one to hundreds.

Q. What is a pistil?

A. A pistil consists of three parts, the germen, the style, and the stigma: the germen is the fruit in its infant state; it is usually seated in the centre of the blossom, and bears a column, called the style, which is crowned by a little head, termed the stigma. In some flowers, the

stigma is merely the summit of the style, assuming no distinct form.

Q. What is the pericarp?

A. The pericarp, or seed-vessel, is the germen grown to maturity: it varies extremely; being pulpy in apples and pears, fleshy in plums and cherries, hard in nuts; or juicy, as in the gooseberry and currant.

Q. Is then the fruit which we eat, the pericarp?

A. The fruit of a plant is the pericarp together with its seeds: in apples, pears, &c. we eat the pericarp; in nuts, we eat the seeds themselves; in the currant, grape, strawberry, &c. both parts are eaten. In some flowers the pericarp is wanting, the seeds lying uncovered at the bottom of the calyx.

Q. How is the seed generated?

A. The anther is provided with a fine dust, called pollen, which falling on the gummy surface of the stigma, is there absorbed and carried down into the germen or seed; whereby it is rendered fruitful and capable of reproducing the plant.

Q. How is the seed constructed?

A. Seeds vary considerably in this respect, but the more essential parts are the embryo, the seed-lobe, and the coat or skin.

Q. What is the embryo?

A. The embryo is the rudiment of the young plant, which is joined by the middle to the seed-lobe; the upper extremity is called the *plumula*, and the lower the radicle: when the seed begins to germinate, the radicle makes its way downwards into the earth, and the *plumula* shoots upwards, and expands into leaves.

Q. What is the seed-lobe?

A. The seed-lobe is commonly the most bulky part of the seed, and contains nourishment to supply the young plant until the root has gained strength. It is called by botanists the cotyledon.

Q. Are there not sometimes more than one seed-lobe?

A. They vary in number: some seeds have one, others have several; the greater number have two, enclosing the embryo between them. When a seed has lain some time in the earth, the seed-lobes, swollen by the moisture they have imbibed, burst through the coat which confines them, and spreading open at the top, give freedom to the young plant.

Q. What is the receptacle?

A. The receptacle is the common base which supports and connects the other parts of the flower: in many plants it is not very conspicuous; in the artichoke it is remarkably large; in the field daisy it is conical and hollow.

CHAPTER VII.

THE CLASSIFICATION OF PLANTS.

T. Describe the Linnæan system.

P. Linnæus disposed the whole vegetable creation into 24 divisions, called *classes*, each of which he subdivided into *orders*.

Q. Upon what principle is this arrangement founded?

A. The Linnæan classification is founded upon the number, situation, and proportion of the stamens.

Q. How are the first ten classes known?

A. By the number of the stamens: the first class has 1 stamen in each flower, the second has 2, and so on to the tenth, the number of stamens distinguishing the number of the class.

Q. How may the *eleventh* class be known?

A. In the eleventh class, each flower contains from 12 to 20 stamens; as in the houseleek and mignonette.

Q. What distinguishes the *twelfth* class?

A. In the twelfth class there are 20 or more stamens in each flower, *inserted into the calyx* or flower-cup; as the cherry, hawthorn, strawberry, &c.

Q. What are the characters of the *thirteenth* class?

A. The plants of the thirteenth class have upwards of 20 stamens, like those of the twelfth, but differ very materially in having them *inserted into the receptacle* or base of the flower; as the poppy, anemone, buttercup, &c.

Q. How is the *fourteenth* class distinguished?

A. The flowers of the fourteenth class have each 2 long and 2 short stamens, the same number as the flowers of the fourth class, but distinguished by this inequality of length.

Q. What plants are comprehended in the *fifteenth?*

A. In the fifteenth class, the flowers have each 6 stamens; of which two being shorter than the rest, distinguish this from the sixth class.

Q. How may the *sixteenth* class be known?

A. The character of the sixteenth class is the union of the lower part of the filaments, so as to form a little tube round the base of the pistil, as in the mallow, &c.

Q. What distinguishes the *seventeenth* class?

A. In the flowers of the seventeenth class, the stamens are connected by the junction of the lower part of the filaments into two sets. Sometimes they are divided equally; sometimes only one is left apart, and all the rest are united.

Q. What is the character of the *eighteenth* class?

A. The eighteenth class has the stamens collected into more than two sets.

Q. How is the *nineteenth* class distinguished?

A. In the nineteenth class the stamens are united by their anthers into a tube, but the filaments are separate; as in the sunflower, daisy, dandelion, &c.

Q. By what is the *twentieth* class known?

A. The twentieth class may be known by the stamens growing out of the pistil itself; as in the common lady's-slipper and orchis.

Q. What plants belong to the *twenty-first* class?

A. The twenty-first class includes the plants in which the stamens and pistils grow in separate flowers, but on the same plant; as the oak, hazel, and fir.

Q. What distinguishes the plants of the *twenty-second* class?

A. In the twenty-second class, the stamens and pistils grow not only on separate flowers, but on separate plants; as in the hop, willow, yew, &c.

Q. How is the *twenty-third* class known?

A. The twenty-third class consists of those plants whose flowers are of three kinds; some having pistils only, some stamens only, and others both stamens and pistils; as the ash, maple, &c.

Q. What plants does the *twenty-fourth* class comprehend?

A. To the twenty-fourth class belong all plants in which the flowers are unknown, or not visible to the naked eye; as ferns, mosses, mushrooms, sea-weeds, &c.

The following list of the classes and their distinctions, may be divided into Lessons, according to the capacity of the juvenile student. Their names, which at first sight appear difficult, are formed of Greek words, expressive of the characters of each class; and those of the first ten classes may be easily remembered, by considering the word *andria*, as meaning the same as *stamens*, and annexing it to the Greek numerals.

TABLE OF THE TWENTY-FOUR CLASSES

1. Monandria	One stamen.
2. Diandria	Two stamens.
3. Triandria	Three stamens.
4. Tetrandria	Four stamens.
5. Pentandria	Five stamens.
6. Hexandria	Six stamens.
7. Heptandria	Seven stamens.
8. Octandria	Eight stamens.
9. Enneandria	Nine stamens.
10. Decandria	Ten stamens.
11. Dodecandria	Twelve to twenty stamens.
12. Icosandria . . .	Twenty or more stamens, inserted into the calyx.
13. Polyandria . . .	Many stamens, inserted into the receptacle.
14. Didynamia . . .	Four stamens; two long and two short.
15. Tetradynamia . . .	Six stamens; four long and two short.
16. Monadelphia . . .	Filaments united at bottom, but separate at top.
17. Diadelphia	Filaments in two sets.
18. Polyadelphia . . .	Filaments in more than two sets.
19. Syngenesia	Stamens united by anthers.
20. Gynandria . . .	Stamens proceeding from the pistils

21. Monœcia	Stamens and pistils in separate flowers, upon the same plant.
22. Dicœcia	Stamens and pistils in separate flowers, upon different plants.
23. Polygamia	Perfect and imperfect flowers on the same plant.
24. Cryptogamia . . .	Flowers not visible to the naked eye.

CHAPTER VIII.

ORDERS, GENERA, SPECIES.

Q. How are the classes subdivided?

A. Each class is divided into *orders;* distinctions in each order produce a further division into *genera;* and genera are again subdivided into *species.*

Q. On what are the *orders* founded?

A. The orders of the first thirteen classes, are founded solely on the number of *pistils* in each flower.

Q. How may the names be recollected?

A. The names of the orders, like those of the classes, are formed from the Greek numerals, but with the addition of the word *gynia*, instead of *andria;* so that when there is but one pistil, the plant is said to be in the order *monogynia;* if there are two, *digynia;* if three, *trigynia*, &c.

T. Name the orders of the first thirteen classes.

P. Monogynia . . .	One pistil.
Digynia	Two pistils.
Trigynia	Three pistils.
Tetragynia . . .	Four pistils.
Pentagynia . . .	Five pistils.
Hexagynia .	Six pistils.

Heptagynia . . .	Seven pistils.
Octagynia . . .	Eight pistils.
Enneagynia . . .	Nine pistils.
Decagynia . . .	Ten pistils.
Dodecagynia . . .	Twelve pistils.
Poligynia	Many pistils.

Q. How many orders are there in the *fourteenth* class *didynamia*?

A. The fourteenth class has only two orders: *gymnospermia*, in which the seeds are naked at the bottom of the calyx, as lavender, mint, &c.; and *angiospermia*, in which they are enclosed in a seed-vessel.

Q. How are the orders of the *fifteenth* class distinguished?

A. The two orders of the fifteenth class are distinguished by the form of the fruit: the first, called *siliculosa*, has broad short pods; and the second, named *siliquosa*, is known by its long pods.

Q. How are the orders of the three following classes known?

A. The orders of the sixteenth, seventeenth, and eighteenth classes, are characterised by the number of *stamens* in each flower.

Q. What do you remark of the other classes?

A. The nineteenth class has five orders, which, being rather difficult to understand, will more properly admit of being explained when the plants of that class shall be examined; the same may be observed of the rest.

Q. What is a *genus*?

A. A genus is a subdivision of an order, and includes such plants as agree with each other in the construction of their flowers and fruits.

Q. What is meant by *species*?

A. The species are the divisions of a genus,

distinguished from each other by some difference in the root, stems, leaves, &c.

T. Exemplify this division of classes, orders, genera, and species.

P. The geranium, from its having ten stamens united into one set, is in the *class monadelphia*, and *order decandria:* the whole family of the geraniums constitute a *genus* of the order; and the different kinds, such as ivy-leaved, rose-scented, &c. are the different *species* of the genus.

Q. To what may this division be compared?

A. A class has been aptly described as bearing some resemblance to an army, an order to a regiment, a genus to a company, and a species to a soldier.

Q. What means do botanists employ to distinguish the species of plants?

A. In distinguishing a plant, two words are employed; the first, which is called the *generic* name, is common to all the species of the same genus; and the second, termed the *specific* name, is confined to a single species.

T. Give an example.

P. In *Rosa damascena* which is the botanic name for the damask rose, *rosa* is the generic name applicable to the whole genus or family of roses, and *damascena* is the specific name, used to distinguish the particular kind or species of rose.*

* The description of the characters of plants upon paper, will appear dry, difficult, and uninteresting, unless the pupil study them with the plant before him, which will at once convert a barren task into a pleasing amusement. In dissecting the flowers, a needle, a sharp-pointed penknife, and a microscope, will be found very useful, as many flowers are too delicate to be divided by the fingers, and the parts of others are too minute to be seen distinctly without the help of a magnifying glass. When the charac-

CHAPTER IX.

CLASS I. MONANDRIA.

Q. What plants are comprehended in the first class?

A. The class *Monandria* consists of such plants as have only one stamen in each flower.

T. Mention the most remarkable.

P. The plants of this class are very few, and chiefly found in tropical countries; but we have the *Hippuris vulgaris* or common mare's tail, and the jointed glass-wort or marsh samphire, the former of which will serve to exemplify the class.

T. Describe the *Hippuris vulgaris*.

P. The *Hippuris vulgaris* grows in the muddy ponds and ditches of most parts of Britain, and flowers in the month of June: the stem is straight, with the leaves growing out of the joints, and the flowers at the base of each leaf.

Q. What is the form of the flower?

A. The flower, which is very small, has no blossom; its single stamen and pistil growing upon the receptacle, as may be seen in the first figure of the annexed plate.

Q. What is the jointed glass-wort?*

ters in the flower do not correspond with the description, it is to be presumed that some of the stamens have fallen off, or that the flower is otherwise imperfect. Several should, in that case, be examined, or a bud that is not yet expanded may be carefully opened.

* Numbers of the peasantry in the Shetland isles, and the Highlands of Scotland, are supported by collecting glass-wort and sea-weeds, and burning them into kelp, an article which produces considerable revenues to the proprietors of those districts. Many of the inhabitants of those dreary regions have nothing to depend upon for subsistence but a miserable pittance which they acquire in this employment.

A. The jointed glass-wort, or marsh samphire, is a very useful plant, found in marshes near the sea: when dried and burnt, its ashes are called kelp, and are used in the manufacture of glass and soap.

Q. What foreign plants belong to this class?

A. In *monandria* are found the beautiful exotic plants which produce ginger, turmeric, arrow-root, and cardamoms.

T. Describe the ginger plant.

P. The ginger plant is a native of the East Indies, and rises in round stalks, about four feet high: it withers about the close of the year; and the roots, which are the only valuable part, are then dug up, scraped and dried with great care, and packed in bags for exportation.

Q. What are the properties of arrowroot, turmeric, and cardamoms?

A. Arrowroot is a powder made from the root of an American plant, and affording a wholesome and palatable food for children; turmeric is a root extensively used for dying yellow; and cardamoms are seeds valuable for their aromatic and medicinal qualities.

CHAPTER X.

CLASS II. DIANDRIA.

Q. What plants are of the second class?

A. To the class *Diandria* belong all the plants which have two stamens in each flower.

Q. What native plants are there of this class?

A. The privet, butterwort, meadow-sage, brook-lime, and others, are common in Britain; and the last of these may be chosen to illustrate the class.

T. Describe the plant.

P. *Veronica beccabunga*, or brooklime, is very common in ditches and shallow streams: the stem is jointed, and about a foot in height; the leaves are oval, of a pale green colour, and growing out of the stem in pairs; the flowers, which rise in bunches from the base of the leaves, are of a faint blue colour, and divided into four small roundish leaves.

Q. How is it known to belong to the second class?

A. Brooklime may be known to belong to the class diandria, by its having two stamens; and to the order *monogynia*, because there is but one pistil.

Q. Has this plant any medicinal qualities?

A. Brooklime was formerly considered of much use in several diseases, and was applied externally to wounds and ulcers: it has a bitterish taste, and is considered very beneficial, if the fresh plant be eaten as food.

Q. What useful exotics belong to this class?

A. In the second class are found the different kinds of pepper-plants, which grow in the East and West Indies; and the olive tree, cultivated in the south of Europe for the sake of its fruit, from which olive oil is extracted by pressing it in a mill.

Q. Are there not some also that delight us with their fragrance?

A. The common lilac, that perfumes the air in summer evenings; the elegant and odoriferous jasmine; the rosemary and sage, cultivated in our gardens, but which grow spontaneously in warmer climates, are all in the second class, and display its characters.

CHAPTER XI.

CLASS III. TRIANDRIA.

Q. How is the third class distinguished?

A. Plants of the third class are distinguished by having three stamens in each flower.

Q. What native plant may be chosen as an example?

A. The *Valeriana officinalis*, or great wild valerian, will serve to exemplify the class: it commonly grows about woods and hedges, flowers in June, and rises to the height of from two to four feet.

T. Describe the plant.

P. The stalk of the valerian is smooth, upright, and branching; the leaves on the stem are placed in pairs, upon short broad sheathes; the flowers are small, of a white or purplish colour, and terminate the stem and branches in large bunches.

Q. What other plants of this class grow wild in England?

A. The different varieties of the spring crocus, one of the earliest ornaments of the flower garden, are well adapted to exemplify this class: one of the species, called saffron crocus, furnishes the drug called saffron, and is very extensively cultivated at Saffron Walden, in Essex, and in some parts of Cambridgeshire.

Q. Are there no other plants of this class that are found in the fields?

A. To the class *Triandria* belong nearly all the different grasses which clothe the fields with verdure, supplying pasture for cattle and grain for man.

Q. Are there not many kinds of grass?

A. Botanists have enumerated upwards of 1300 varieties, all which may be known by a straight hollow stalk, called the culm or straw, sheathed with long tapering leaves, growing out of the joints of the stalk.

Q. What are their parts of fructification?

A. The fructification in grasses, is in the ear or head, and consists of two green husks, forming the calyx, within which is a small blossom of two valves, containing three delicate stamens, that hang over the calyx, and being agitated by every breath of air, give the ear, when in bloom, a very pretty appearance.

Q. What are the grasses used as food for man?

A. Wheat, barley, oats, rye, and all the different kinds of corn, are the seeds of various grasses; they are not natives of this country, but were originally introduced into Europe from Asia.

Q. What are their different uses?

A. Wheat, when reduced to flour, is made into bread, which has been emphatically termed *the staff of life:* barley is chiefly converted into malt, for making beer; oats serve as food for horses, but, in Scotland and Ireland, are often ground into meal, for porridge and bread.

Q. What other exotic grasses are valuable to man?

A. The sugar-cane which grows to the height of ten feet, is cultivated, in the East and West Indies, for the sake of the juice, from which various kinds of sugar are prepared.

CHAPTER XII.

CLASS IV. TETRANDRIA.

Q. How is a plant of the fourth class known?

A. All plants of which the flowers have four stamens of an equal length,* belong to the fourth class.

Q. What native examples are there of this class?

A. Among the most common are teazel, madder, pond-weed, and holly.

Q. Describe the holly tree.

A. The holly is a well known evergreen† of singular beauty, with shining prickly leaves, and white flowers, which grow in clusters round the branches, and are succeeded by berries of a bright scarlet colour, containing four very hard seeds.

Q. Is this plant applied to any useful purpose?

A. Birdlime is made from the inner bark of the holly, by beating it in a running stream, and leaving it to ferment in a close vessel: in severe winters, also, when other food is scarce, the upper boughs, which have smooth leaves, are cut down, and afford a grateful food to deer and sheep.

Q. What are the uses of teasel?

A. The heads of one species, called Fuller's Teasel, are armed with hooked bristles, useful in raising the nap of woollen cloth; for which purpose the plant is much cultivated in the West of England.

* It is necessary to caution the pupil against confounding this with the fourteenth class, in which the number of stamens is the same, but of unequal length, two being short and two long.

† An evergreen is a plant which retains its green leaves during both winter and summer.

Q. For what purpose is madder employed?

A. The roots of madder yield a beautiful scarlet dye; but the species chiefly used, is the dyer's madder, a native of the South of Europe; which affords a finer colour than the British species, commonly called wild madder.

Q. Which are the more remarkable exotics of this class?

A. Besides many beautiful plants, it includes the sandal-wood, and the chay-root, of the East Indies; the former much esteemed for the fragrance of the central wood, the latter cultivated in Coromandel, for the fine dyes afforded by its bark.

CHAPTER XIII.

CLASS V. PENTANDRIA.

Q. What plants belong to the fifth class?

A. Plants whose flowers have five stamens, belong to the fifth class: this is the most numerous of all the classes, as it comprehends more than one tenth of the plants at present known.

Q. What native plant may be examined in this class?

A. The *Verbascum nigrum*, black mullein, one of the handsomest native plants in this handsome class, will afford a good specimen.

Q. In what does its beauty principally consist?

A. In its fine spike of flowers. From a bush of large, thick, downy leaves, rises a stem, three or four feet high, bearing a few smaller leaves, and terminating in a magnificent spike of flowers of a golden yellow, the filaments of which are so thickly clothed with silky purple hairs as to have the appearance of a star of purple chenille.

Q. Is not the Belladonna in this class?

A. It is, and a knowledge of its habits and conformation will be the more useful as every part of the plant is highly poisonous, and when eaten has often proved fatal in its effects.*

Q. Describe the plant.

A. The Atropa belladonna, or deadly nightshade, grows in woods, hedges, and shady waste grounds, and is from three to five feet in height: the whole plant is covered with fine hair, and the leaves are of an oval shape, standing in pairs upon short footstalks.

Q. What is the shape and colour of its flowers and fruit?

A. The flowers are bell-shaped, and of a dark purple colour: they appear in June or July; but the berries are not ripe till September, when they too frequently tempt children to eat them, by their shining black colour and sweet taste.

Q. Is there no other species of nightshade?

A. The garden nightshade, whose flowers are white and the ripe berries black, and the woody nightshade, which grows in hedges, and bears red berries, are both poisonous, and belong to this class, though of a different genus.

* Some young persons at Edinburgh, perceiving in a garden the beautiful berries of the deadly nightshade, and, being unacquainted with their poisonous quality, ate several. Scarcely half an hour had elapsed before violent symptoms appeared, followed by insanity, gnashing of the teeth, and convulsions. Their bodies swelled, their faces became red and tumid, and in nine hours after, two of them expired, notwithstanding every medical assistance that could be bestowed on them. It may be necessary to remark, that vinegar, liberally drunk, has been found to counteract the effect of this dangerous poison. From the pains taken to eradicate it, this plant is now rarely seen.

Q. What other native plants belong to the fifth class?

A. Native plants of this class are very numerous; among the most common and interesting, are the primrose, cowslip, violet, polyanthus, and honeysuckle; besides parsley, hemlock, fennel, and other umbelliferous plants.

Q. What are unbelliferous plants?

A. An umbelliferous plant is one which sends out from the upper part of the stem, as from a centre, a number of stalks, which spreading like the spokes of an umbrella, crown the stem with a great number of small flowers; and in the compound umbel, each spoke bears a little umbel at its end.

Q. Name some of the useful native plants of this class.

A. The refreshing currant and gooseberry; the common flax, alike elegant and ueful; the creeping and ornamental ivy; and the elder-tree, of which the wood is used in manufacturing musical instruments, and the berries are made into wine.

Q. What are the most remarkable exotics?

A. To the fifth class belong the potato, which was first brought from America by Sir Walter Raleigh; the tomato or love-apple; the vine; the capsicum, or guinea-pepper; the coffee tree; and the tobacco plant, above five or six feet in height, from the leaves of which many different kinds of tobacco and snuff are prepared. Among those with which we are less familiar are the Mango tree, of which the fruit is so much esteemed in the Levant, and the Teak-tree, called the Oak of the East.

CHAPTER XIV.

CLASS VI. HEXANDRIA.

Q. Of what plants does the sixth class consist?

A. To the class *Hexandria* belong the plants whose flowers contain six stamens; as may be seen in the lily, and many other beautiful flowers of the same tribe.

Q. Describe the lily.*

A. The *Lilium candidum*, or common white lily, usually rises about three feet in height, with long narrow pointed leaves, irregularly scattered over the stem: the flower has no calyx; and the corolla is bell-shaped, consisting of six petals, within which are the stamens and one pistil, furnished with a long triangular stigma. *See plate.*

Q. When does it flower?

A. The lily flowers in June and July; and, although not a native of England, it now very commonly decorates the borders of our gardens, not unfrequently attended by the splendid orange lily, belonging to the same class.

Q. What other flowers belong to this class?

A. *Hexandria* includes a most beautiful and brilliant assemblage of flowers: as the modest snowdrop, the delightful amaryllis, the fragrant lily of the valey, the showy tulip, the narcissus, the hyacinth, and numerous others which either delight the eye with their various hues, or sweeten the air by their fragrance.

Q. What useful plants do you notice?

* The white lily, though an exotic, has been chosen in preference to a native plant, as all its parts are very distinct, and it is now very generally to be met with.

A. The valuable rice plant, a grass with six stamens, cultivated throughout the East, as the primary article of food, the same as wheat with us; the barberry, the acid berries of which, boiled with sugar, are used as a sweetmeat; the delicious pine-apple; and the asparagus, sorrel, and garlick, which serve for many culinary purposes, are of the class hexandria. Among the more remarkable exotics are the agave or American aloe, the plantain tree, and the talipot tree; of all which travellers have given very interesting accounts.

Q. Where does the plantain tree grow?

A. The plantain tree grows in all the West-India islands, and is one of the greatest blessings of the negro slaves: the stalk rises to the height of twenty feet, and at the top produces leaves often eight feet long, but remarkably thin and tender.

Q. In what respect is this tree so useful?

A. The fruit, or plantains, are an excellent substitute for bread, and are used as such by the negroes: they are about a foot long, and from three to six inches round, with a tough skin, under which is the soft pulp that is roasted and eaten; every other part of the tree is applied to some useful purpose.

CHAPTER XV.

CLASS VII. HEPTANDRIA.

Q. What plants does the seventh class contain?

A. The seventh class, Heptandria, is composed of such plants as have, in their flowers, seven

stamens; it contains fewer plants than any other, and has but one native specimen.

Q. What is its name?

A. The only indigenous plant is the *Trientalis europæa*, or chickweed winter-green, which grows chiefly on the Scotch mountains, but is sometimes found on turfy heaths in the northern counties of England.

Q. What example do you propose to give of this class?

A. The horse-chesnut, or *Æsculus hippocastanum*, one of the most superb ornaments of our parks and pleasure-grounds, will serve as a specimen: it is a native of the north of Asia; and in the month of May, bears clusters of flowers in the form of pyramids, which make a beautiful appearance.

Q. Give a botanical description of its flowers.

A. The calyx is tubular, and divided at the brim into five short segments; the corolla consists of five petals, inserted into the calyx by narrow claws, and is of a fine white colour, irregularly spotted with red and yellow.

Q. How is it known to belong to the seventh class?

A. The horse-chesnut pertains to this class, from its having seven stamens; the filaments of which are tapering, about the length of the corolla, and supplied with pointed anthers: its single pistil indicates it to be in the order *monogynia*. *See plate.*

Q. To what uses is this tree applied?

A. The fruit, which is contained in prickly husks, is the favorite food of deer, and is also eaten by horses, sheep, and oxen: when ground, starch has been made of the flour, and it is used

on the Continent, for the purpose of cleaning woollens and bleaching linens: the bark is also sometimes used in medicine.

CHAPTER XVI.

CLASS VIII. OCTANDRIA.

Q. What plants constitute the eighth class?

A. The class Octandria is distinguished by its flowers bearing eight stamens.

Q. What plant will you select to exemplify the class?

A. *Chlora perfoliata*, yellow-wort, is in this class; it is found growing in the sandy soils of Norfolk, and other parts of the country, it flowers in July, and grows about a foot high. Few plants are more remarkable for elegance.

Q. What other native plants does it contain?

A. Among the native plants are the hairy willow-herb, vulgarly called codlings and cream; the cranberry, and whortle-berry shrubs, the fruit of which is much esteemed by confectioners, for tarts; and the beautiful mezereon shrub, one of the earliest productions of Flora, often exhibiting its brilliant scarlet flowers in January and February.

Q. What are the principal foreign ones?

A. To the eighth class belong the balm of Gilead tree, so valuable in medicine, which grows in several parts of Africa and Asia; the rosewood tree, useful for ornamental purposes; the flame-coloured and well-known nasturtium; and the numerous and beautiful genus of heaths, of which

only four species are found in Britain, but many hundreds have been imported from the Cape of Good Hope.

Q. Is not the maple tree also in this class?

A. The maple and sycamore trees have, by some naturalists, been removed into this class from the twenty-third. The sugar-maple is very useful to the inhabitants of North America, who make large quantities of sugar from the juice or sap, which flows on piercing the trunk of the tree in Spring.

CHAPTER XVII.

CLASS IX. ENNEANDRIA.

Q. How is the ninth class known?

A. The ninth class consists of plants whose flowers have nine stamens: there is but one British specimen, the beautiful flowering-rush, which grows on the margins of pools and slow-running streams.*

Q. Describe the plant.

A. The *Butomus umbellatus*, or flowering-rush, rises from the water with a round smooth stalk, from two or five feet high; at the top is a head of rose-coloured flowers, each of which is composed of six petals, hollowed out like a bowl, and three of them smaller than the rest.

Q. In what order is it?

* The stately appearance and beautiful flowers of this plant in the summer months, are inferior to scarcely any other aquatic plants: no piece of water should, therefore, be destitute of so elegant an ornament. It is of easy culture: taken from its place of growth, and sunk into the water with a stone to keep it fixed, it is sure of succeeding.

A. The flowering-rush is in the order *hexagynia*, from its having six pistils. *See plate, fig.* 9.

Q. What foreign plants belong to the ninth class?

A. The principal foreign specimens are the cinnamon, sassafras, and camphor; the bay tree, with which the ancients crowned their victorious generals; the cashew-nut tree; and the rhubarb plant.

Q. How is cinnamon procured?

A. Cinnamon is the inner bark of a small laurel tree growing in the East Indies: the bark, while on the trees, is first freed of its external greenish coat; it is then cut lengthwise, stripped from the trees, and dried in sand, where it becomes of a reddish yellow colour, and curls up into quills or canes.

Q. What is camphor?

A. Camphor is a valuable drug, produced by a tree of large growth in Japan.

Q. Describe the plant which produces the rhubarb.

A. The rhubarb plant is a native of Turkey in Asia, where it rises to the height of six or eight feet: the part useful in medicine is the root, which is chiefly brought from Turkey, in roundish pieces of a lively yellow colour, variegated with streaks of bright red: the leaf stalks make pleasant tarts.

CHAPTER XVIII.

CLASS X. DECANDRIA.

Q. What plants are comprehended in the class Decandria?

A. The tenth class comprises the plants whose flowers have ten stamens.

Q. Mention some of the native plants.

A. In this class is included a great assemblage of fine native plants and flowers: as the beautiful pink or carnation tribe; the numerous saxifrages, one species of which bears the name of London-pride; and the *Arbutus*, or strawberry tree, which grows wild in Ireland, and is remarkable for bearing flowers in November, and ripening its fruit in the ensuing winter.

Q. What plant may be selected to exemplify the tenth class?

A. *Dianthus deltoides*, the maiden pink, which grows in sandy pastures, and from July to October, bears its pretty flowers; which are of a rose-colour, with a ring of a deeper hue near the centre.

Q. What other native plants will serve as specimens?

A. We may examine the garden rue; the corn-cockle, found in corn fields in June and July; the common chickweed; the stone crops, yellow flowered succulent plants growing on walls and roofs; and the *Silene* or catch-fly, which takes its name from its habit of entrapping flies with its clammy exudations.

Q. Are there no trees in this class?

A. The only native tree is the arbutus, already mentioned; but among the foreign ones are those

that produce the mahogany, lignum-vitæ, log-wood, and Brasil wood.

Q. Describe the mahogany tree.

A. The mahogany-tree grows to a large size in the warmest parts of America, and is very profitable to the Britsh settlers: the wood is preferred to any other for ornamental purposes, as it takes a fine polish, is beautifully variegated, and very durable.*

Q. What is lignum-vitæ?

A. Lignum-vitæ is the wood of a large tree, growing in the West Indies: it is so heavy as to sink in water; and, from its hardness and beauty, is in great demand for various articles of turnery ware.

Q. Whence is log-wood chiefly imported?

A. The log-wood tree is smaller than the lignum-vitæ, and grows to the highest perfection at Campeachy, in the bay of Honduras, in South America: the wood, which is of a dark red colour, is of the greatest use in dying and staining wood, and is brought to Europe in junks or logs of about a yard in length, which are cut in pieces, and bruised in a mill, before being used by the dyer.

Q. For what is Brasil wood used?

A. Brasil wood comes from the West Indies, and is chiefly used for given a beautiful scarlet colour to cloth; but, from its taking a high polish and from its lively colour, it is often wrought into various elegant articles of turnery.

* This valuable wood was first brought to England by the captain of a merchantman, as ballast for his vessel, and was laid aside as useless, till it was accidentally found to be so beautiful, that it became in great request. It has ever since been imported in large quantities, for making furniture and other articles, in which oak was before generally used.

CHAPTER XIX.

CLASS XI. DODECANDRIA.

Q. What kind of plants belongs to the eleventh class?

A. The eleventh class consists of plants having flowers with from 12 to 20 stamens in each.

Q. What well-known plants belong to this class?

A. In the class *Dodecandria* are found, the purple loose-strife, common on the banks of rivers; the common agrimony; weld, or dyer's weed; the delightful mignonette, originally brought from Egypt; and the common house-leek, which will serve as an example of the class.

Q. Where is the houseleek found?

A. The *Sempervivum tectorum*, or common houseleek, is a small evergreen that grows in clusters on the roofs of cottages and the tops of old walls; the leaves grow in thick tufts, are of a fleshy substance, and fringed at the edges with hair.

Q. Give a botanical description of its flowers.

A. The calyx is divided into 12 parts; the corolla is longer than the calyx, and consists of 12 or more petals; and the number of stamens is the same as that of the petals.

Q. In what order is it?

A. The houseleek is known to be in the order *dodecagynia*, from its having about 12 pistils, which are placed in a circle within the stamens; the germens gradually decline into sharp summits, and the flower is succeeded by twelve capsules.*

* The examination of plants of this class, is often unsatisfactory to the novice, as the stamens vary from 12 to 20,

Q. To what use is weld applied?

A. Weld, or dyer's weed, is cultivated on the chalky hills of Surrey, and is made great use of for dying woollen, silk, or cotton, of a beautiful yellow colour: its flowers have been observed to follow the course of the sun, turning towards the east at sunrise, towards the west at its setting, and at midnight pointing to the north.

Q. Are there any remarkable exotics of this class?

A. It includes the Mangosteen, the fruit of which, in the West Indies, is esteemed as second only to the pine-apple.

CHAPTER XX.

CLASS XII. ICOSANDRIA.

Q. How is the class Icosandria known?

A. The twelfth class, Icosandria, has 20 stamens or more, inserted into the calyx.

Q. What plants does it comprehend?

A. This class contains the most esteemed fruit-trees, such as the apple, pear, plum, medlar, cherry, and their different varieties; besides a pleasing assemblage of shrubs and herbs, as the strawberry, the raspberry, the rose, the sweetbriar, the bramble, &c.

Q. Do all these grow wild in England?

A. They do; and it is remarkable that the

and are sometimes even fewer than 12, coming out at different periods. In the houseleek this uncertainty occurs in all the parts of the flower, particularly in the number of pistils, which differs according to the richness of the soil in which the plant is found.

wild apple or crabtree is the original from which all the garden varieties are derived; as the bullace, or wild plum, is the parent stock of the exquisite *magnum bonum*, greengage, and other plums.

Q. What plant will you examine in this class?*

A. The *rosa canina*, or dog-rose, which frequently makes a conspicuous and beautiful appearance in woods and hedges, in the month of June, will serve as a specimen of the class.

Q. Describe the flower.

A. The dog-rose has a corolla of five heart-shaped petals, each fixed by a sort of claw to the neck of the calyx; the stamens are numerous, and attached to the sides of the calyx.

Q. What is remarkable of the calyx?

A. The calyx is composed of one leaf, with five long and narrow divisions, two of which have teeth on both edges, another is toothed on one edge only, and the other two are entire: when the blossom falls off, the calyx contracts at the neck; the fruit is a red berry, containing numerous seeds.†

Q. What are the most remarkable exotics of the twelfth class?

A. Among the foreign plants of this class, are

* It may be proper, in this place, to caution the pupil against consulting flowers that are double, like those of the garden-rose; as in becoming double they commonly lose their distinctive character, and are therefore useless to the botanist. Great richness of soil and high cultivation, have this effect upon single flowers; and the stamens, in some kinds, are converted into petals, so that they no longer produce seed. By transplanting the plant into a poorer soil, it is usually brought back to its natural state.

† The small part on the top of an apple, called the eye, is nothing but the calyx remaining fixed on the top of the germ till it comes to maturity.

the almond and peach trees, the clovetree, the laurel, and the myrtle.

Q. Describe the almond tree.

A. The almond tree is a native of Barbary, it usually rises from 12 to 16 feet in height, and has long pointed leaves of a bright green colour: the exterior of the fruit is a tough hairy substance, within which is the thick rough shell that contains the kernel.

Q. Where does the clove tree grow?

A. The tree which produces this well-known spice, is a native of the East Indies, and in its general appearance resembles the laurel: the parts used are the unexpanded flowers, which acquire their dark brown colour from the smoke by which they are dried, in order to preserve their aromatic qualities.

Q. What do you remark of the laurel and myrtle?

A. The common laurel, a hardy evergreen, was originally introduced from the Levant;* that elegant little shrub, the myrtle, grows wild in Asia and Africa; and one species of it, in the West Indies, rises to the height of above 30 feet, and produces the berries called pimento, or all-spice.

Q. Does not the plant called the cochineal-fig belong to this class?

A. It does: it is a species of the genus *Cactus*, which contains many curious and interesting plants. The flowers of the *Cactus grandiflorus*, and some others, are truly magnificent. Another

* It should be observed that the common Laurel, or as it is specifically termed, the Cherry-laurel is not of the genus Laurus: it is the *Prunus lauro-cerasus*.

curious, extensive, and splendid genus of this class, is the Mesembryanthemum, of which nearly 300 species have been cultivated in this country.

CHAPTER XXI.

CLASS XIII. POLYANDRIA.

Q. What characterizes the thirteenth class, Polyandria?

A. In the thirteenth class the stamens are numerous, from 20 to 1000, rising immediately from the receptacle.

Q. How is this class further distinguished from the last, in which the stamens were fixed in the calyx?

A. In the class *Icosandria*, the calyx is always of one piece, divided at its border, and usually permanent; whereas, in this class, *Polyandria*, if the flower have a calyx at all, it consists of two or more leaves, which generally fall off as soon as the blossom opens.*

Q. What plant will you select for examination?

A. The common red poppy, (Papaver rhæas,) which is found in corn-fields, and flowers in June and July, will afford a good example.

Q. Describe the flower.

* From the resemblance in the structure between the plants of this and those of the preceding class, some late writers on Botany have injudiciously united them into one. It is, however, very important to preserve them distinct, as the character of the class *Icosandria*, indicates the pulpy fruits which accompany it to be infallibly wholesome; whereas some of the other class are absolutely poisonous. Sir J. E. Smith has observed, that no traveller in the most unknown wilderness need be afraid to eat the fruit of any plan whose stamens grow upon the calyx.

A. The calyx consists of two oval leaves, which fall off as the flower expands; the corolla is composed of four roundish petals, of a bright scarlet colour, and marked at the base with a shining black spot; the germen is shaped like an urn; there is no style; and the summit is convex, and divided into rays like the spokes of a wheel.

Q. Is not opium obtained from a species of the poppy?

A. The large white poppy, from which opium is procured, is a native of England, but in the eastern countries it is regularly cultivated, and is a source of considerable profit to the inhabitants.

Q. How is opium produced?

A. When the seed-vessels of the poppy are half grown, several incisions are made in them, with a sharp instrument, and the milky fluid which exudes, is scraped off, and when sufficiently dried in the sun, is formed into cakes or rolls for sale.

Q. To what uses is it applied?

A. Opium is of great use in medicine, inducing sleep and allaying pain: the Turks and other eastern nations, use it to produce intoxication, and chew it in the same manner as English sailors do tobacco.

Q. What other native plants belong to this class?

A. The class *Polyandria* is also exemplified in the water-lily, whose foliage and beautiful flowers make a fine appearance on the surface of ponds; the lime-tree, the pæony, crowfoot, marsh-marygold, monkshood,* hellebore, and those brilliant ornaments of the parterre, the ranunculus and the anemone.

* Monkshood is a poisonous plant, to which children should not be suffered to have access.

Q. What remarkable foreign plants are there?

A. To this class belong the caper shrub, and the tea tree which affords the agreeable beverage now almost universally used in this country.*

Q. Of what country is the caper bush a native?

A. The pickle in common use, under the name of capers, is made of the young flower-buds of a beautiful shrub found in the Levant and the South of France, where it grows wild among rocks and rubbish, and is as common as the bramble is with us.

Q. Describe the tea tree.

A. The tea tree, which is cultivated as an important article of commerce in China and Japan, is an evergreen, attaining to the height of from six to ten feet, much branched, and covered with a rough dark-grey bark: the flowers are white, somewhat resembling those of the dog-rose; and the leaves, which are the only valuable part, are narrow and tapering, and about an inch and a half in length.

Q. In what manner are the leaves prepared?

A. When the tree is three years old, the leaves are carefully gathered, and put into a large iron pan over a furnace, where they are dried to a certain degree; they are then spread upon mats, and rolled by workmen between the palms of their hands, after which they are cooled as speedily as possible; and the process is repeated several times with the same leaves, before they become fit for use.†

* Some botanists place the tea tree in the sixteenth class, and in the genus Camellia.

† Tea was first introduced into Europe from China, by the Dutch merchants, in 1641; and into England about the year 1666, when it sold for 60 shillings per pound. In

CHAPTER XXII.

CLASS XIV. DIDYNAMIA.

Q. What are the characters of the class *Didynamia*?

A. The plants of the fourteenth class are distinguished by the proportion of the stamens, which are four in each flower, two long and two short.

Q. How are they further distinguished?

A. In the present class, the flowers are of a particular structure, the corolla being either of that form which is called ringent, or gaping, from its resemblance to an open mouth; or personate.

Q. Give an example.

A. The common white dead-nettle, *Lamium album*, which is found growing in every hedge, is in this class, and will serve as a specimen.

Q. Describe the construction of the flower.

A. The flowers are inserted round the stem in whirls or rings; each corolla is of one piece, of a tubular shape, and divided at the top into two lips, of which the upper is called the helmet.

Q. Where are the stamens situated?

A. By lifting up the helmet, four stamens are discovered in two pairs, and of a dark colour; and in the midst of them is a forked style, which remains fixed to the receptacle, when the stamens are pulled off with the corolla.*

China and Japan, it is drunk as commonly as beer is in England, and is sold in the same manner in every town, and on every road. It is there, however, used without sugar or cream.

* In the first thirteen classes the orders have been distinguished solely by the number of styles in each flower; but

Q. Are there any other native plants?

A. Native plants of this class, are of common occurrence, both in fields and gardens; as the ground-ivy, mint, common marjoram, thyme, eye-bright, snap-dragon, yellow-rattle, and fox-glove; besides lavender, and many others introduced from foreign countries.

Q. Do no trees belong to this class?

A. Of the fifteenth class there are no trees natives of England, and few foreign ones. The most remarkable is the calabash tree of the West Indies, which produces fruit so large, that the shell is capable of holding 12 pints of water, and being hard, is converted into bowls, dishes, spoons, &c.

CHAPTER XXIII.

CLASS XV. TETRADYNAMIA.

Q. What plants belong to the class *Tetradynamia*?

A. The plants of the fifteenth class, have flowers with six stamens, four of which are longer than the other two.*

in the remaining classes, the orders are formed by other circumstances, which it is necessary to point out.

The fourteenth class has two orders, distinguished by the nature of the seed:

1. *Gymnospermia* has four naked seeds at the bottom of the calyx; as is seen in the dead-nettle and scullcap.

2. *Angiospermia*, has numerous seeds covered with a pericarp; as in snap-dragon and yellow-rattle.

* To assist the student in distinguishing this class from the sixth, in which the stamens are of equal length, he may remember that the flowers of the fifteenth class have always four petals, which form a cross, being regularly placed in

Q. What native plants of this class may be commonly met with?

A. Examples of *Tetradynamia* are found in the shepherd's purse, honesty, candy-tuft, and scurvy-grass, which grow wild in the fields; in the cultivated turnip, cabbage, radish, and mustard; and the sweet-scented wallflower and stock.

Q. Give a botanical description of the wallflower.

A. The wallflower has a calyx of four spear-shaped leaves, and a corolla of four petals of a roundish form, fastened to the receptacle by a claw as long as the calyx: the divided summit of the pistil, and four of the stamens, are visible in the unopened flower, but the two shorter ones remain concealed within the calyx.

Q. Of what shape is the seed-vessel?

A. When the corolla falls off, the germ of the wallflower grows into a long silique or pod, containing several flat egg-shaped seeds; and when nearly ripe, it opens at the bottom in two valves, and discloses the seeds ranged on both sides of the membrane which separates the valves.

Q. Have all cruciform flowers the same kind of seed-vessels?

A. In some plants of this tribe, the seed-vessel is a roundish pouch or pod, as may be seen in the horse-radish, shepherd's purse, and the oval silky pouches of honesty.*

pairs opposite to each other, and are thence called cruciform, or cross-shaped.

* This difference in the shape of the seed-vessel, forms the two orders into which the class is divided.

1. *Siliculosa*, has the seeds in a pouch, more broad than long; as shepherd's purse and honesty.

2 *Siliquosa*, in which the seeds are contained in a long pod; such as the wallflower, stock, turnip, and radish.

Q. What is mustard?

A. Mustard (*Sinapis nigra*,) is a plant known by its bright yellow flower, that grows wild in corn-fields, but is cultivated to great advantage in the county of Durham, for the sake of the seeds, which, when powdered, produce the mustard in common use at our tables.

Q. For what is woad used?

A. Woad is chiefly cultivated in Somersetshire, and is extensively used in dying woollen cloth of a fine blue colour: it is said to be the plant with which the ancient Britons painted their bodies, to give them a bluish appearance, and a more dreadful aspect in battle.

CHAPTER XXIV.

CLASS XVI. MONADELPHIA.

Q. How are plants of the class *Monadelphia* distinguished?

A. In the sixteenth class, the stamens are combined by their filaments into one tube, or common base.

Q. What familiar plants will serve to exemplify it?

A. The characters of this class, may be observed in the common mallow, the holly-hock, the large and beautiful family of geraniums, the passion-flower, and the hibiscus.

Q. What useful exotics does it comprehend?

A. The most valuable is the cotton plant, which is cultivated in the East and West Indies, and other hot countries: the seed-vessels contain a

white downy substance, which, after undergoing the process of carding and spinning is woven into the cloth called cotton.

Q. Is not nankin also a species of cotton?

A. Nankin is manufactured from a cotton of a reddish yellow colour, which is produced in China, in the province of which Nankin is the capital: it is of considerable value, on account of its durability, and never losing its colour, even with long use and frequent washing.

Q. What other remarkable exotics do you remember?

A. The Tamarind tree is of this class, and the Sour-gourd or Monkey-bread, the trunk of which is larger than that of any other known tree. It is a native of Senegal, where Mr. Adanson observed several that were from 21 to 25 feet in diameter.

Q. Will it not be proper to examine a plant in this class?

A. The common mallow will be very fit for that purpose, as it affords a good example of the construction of the whole class.

Q. Where is it found?

A. The mallow is common under hedges, and in waste ground, and flowers from June to September.

T. Describe the common mallow.

P. Malva sylvestris, or common mallow, rises from one to three feet in height, has a rough upright and branched stem, and hairy leaves, with five or seven divisions, unequally notched at the edges, and a purplish stain near the stalk.

Q. What are the characters of the flowers?

A. The flowers are large, consisting of five heart-shaped petals, of a purple colour, painted

with veins of a deeper hue: the calyx is double; and the middle of the receptacle rises like a little pillar, supporting many thread-like stigmas, and surrounded by numerous combined *stamens*.*

CHAPTER XXV.

CLASS XVII. DIADELPHIA.

Q. Of what plants does the seventeenth class consist?

A. The seventeenth class, *Diadelphia*, contains the plants whose stamens are combined by their filaments into two parcels or sets, for the most part in unequal numbers.

Q. How are the plants of this class further distinguished?

A. Their flowers are nearly all of the same form, called papilionaceous, or butterfly-shaped, from a fancied relation to the form of a butterfly.

Q. What examples can you give of the class?

A. Among the native plants are peas, beans, vetches, broom, furze, and clover.

Q. What papilionaceous flower will you select as a specimen?

A. The fragrant sweet pea, or the garden pea, some of whose flowers may be procured during

* The sixteenth class has eight orders, which are distinguished by the number of stamens:

1. *Triandria*, three stamens.
2. *Pentandria*, five stamens.
3. *Heptandria*, seven stamens.
4. *Octandria*, eight stamens.
5. *Decandria*, ten stamens.
6. *Endecandria*, eleven stamens.
7. *Dodecandria*, twelve stamens.
8. *Polyandria*, many stamens.

the greater part of the year, will serve to illustrate the class.

Q. How is the flower formed?

A. The flower consists of five petals, the largest of which, that turns upwards, is called the standard; the two side-pieces resembling each other, are the wings, below which is the keel, formed of two petals united towards the base.

Q. Where are the stamens and pistil?

A. On drawing the keel gently downwards, the germ is seen surrounded by the membrane formed by the filaments, of which nine of the ten are combined from the base nearly to the summit.

Q. Where do you observe the character of the class *diadelphia*?

A. By examining the membrane more closely, two small holes will be discovered near the base, and on inserting a needle through both, one stamen will separate from the rest, and thus will form two sets, displaying the character of the class. *See plate.*

Q. How is the seed-vessel constructed?

A. The pod or legume of the papilionaceous tribe, is not divided by a partition, like the pod or silique of the wallflower, but the seeds are fastened alternately to each valve, and all of them to the thick edge of the legume.*

* The class diadelphia, is divided into four orders, named from the number of the stamens.

1. *Pentandria,* five stamens.

2. *Hexandria,* six stamens in which the filaments are separated into two bodies, each having three anthers; as in fumitory.

3. *Octandria,* eight stamens.

4. *Decandria,* ten stamens, contains the plants which are usually termed leguminous, such as peas, beans, vetches, broom, furze, and trefoil.

Q. What remarkable exotics does this class contain?

A. Besides the locust tree, commonly called the acacia, the laburnum, and other ornaments of the shrubbery, the seventeenth class has the liquorice tree, and the Indigo plant of the East and West Indies, whose leaves afford the blue dye so called.

T. Describe the liquorice plant.

P. The liquorice plant is a native of the South of Europe, but is extensively cultivated at Pontefract, in Yorkshire, and in other parts of England: the plant rises four or five feet in height; and, after three years' growth, the roots are dug up for sale.

Q. What properties does this root possess?

A. Liquorice has a very rich sweet taste, and is almost the only sweet that quenches thirst: it is very useful in obstinate coughs, and an infusion or extract, conceals the taste of unpalatable drugs more effectually than syrups, or any sugared substance.

CHAPTER XXVI.

CLASS XVIII. POLYADELPHIA.

Q. What is the character of the eighteenth class?

A. In the flowers of the class *Polyadelphia* the stamens are collected into more than two parcels or sets, each parcel united at the bottom by the filaments.

Q. What native plants are of this class?

A. The eighteenth class does not contain many plants, and the only genus found in England is the St. John's wort; one species of which, *Hypericum androsæmum*, or tutsan, will serve as an example.

Q. In what situations does it grow?

A. Tutsan grows in woods and damp uncultivated grounds, but is not very common: it bears flowers in July, of a rich yellow colour, on a shrub-like stem, about a foot and a half in height.

T. Describe the flower.

P. The calyx is placed below the germen, and consists of five acute leaves; the petals are also five in number, and of an irregular oval shape; the stamens are numerous, and commonly united at their bases into three portions or bundles; (*see plate;*) the seed-vessel, when ripe, is of a purplish black colour.*

T. Mention some of the foreign plants.

P. Among the most interesting foreign plants, are the chocolate-nut tree, and the orange, lemon, and citron trees.

Q. Of what part of the world are the orange and lemon trees natives?

A. The orange and lemon are natives of Asia, but they have been long cultivated in the open fields

* This class, as arranged by Sir J. E. Smith, has three orders, distinguished by the number or insertion of the stamens:

1. *Dodecandria*, having stamens 12 in number, and their filaments unconnected with the calyx, as in the orange and lemon.

2. *Icosandria*, having 20 stamens, their filaments inserted (in several parcels) into the calyx.

3. *Polyandria*, having many stamens unconnected with the calyx, as in tutsan, and the several kinds of St. John's wort.

in Spain, Portugal, and all the warmer parts of Europe: they are very handsome evergreens, and often adorn the greenhouses of this country, where, however, they rarely attain to their natural size, or bring their fruit to perfection.

Q. What medicinal qualities do oranges possess?

A. The juice of the orange is a grateful acid, of considerable use in fevers and inflammatory disorders, for allaying heat and quenching thirst: it is also of great efficacy in preventing and curing the scurvy: the outer yellow rind warms the stomach, and promotes appetite; and the flowers, which are extremely fragrant, are much used in perfumes.

Q. What do you remark of the lemon?

A. The lemon possesses similar medicinal virtues with the orange; but, as its acid is stronger, it is often employed to restrain vomiting: the juice, as well as the rind, is also used in cookery, confectionery, &c.

CHAPTER XXVII.

CLASS XIX. SYNGENESIA.

Q. What plants are comprised in this class?

A. The nineteenth class *Syngenesia*, contains plants bearing flowers which are termed compound, and which have many distinct florets on one common receptacle.

Q. What plant will you examine?

A. The plants of this class are very numerous, and easily procured; as the dandelion, thistle, blue-bottle, groundsel, coltsfoot, &c. but the most pleasing specimen, perhaps, is the humble daisy,

the common ornament of our fields during the summer months.

T. Describe the general appearance of the daisy.

P. The daisy differs from any flower already examined, and is more interesting, as all those apparent white and pink petals, are in reality so many true flowers; and every one of those yellow spots in the middle is a real flower also.

T. Examine one of the exterior white petals.

P. There is a long white part tipped with red, and at the lower end by which it is fastened, appears a little tube, that contains a thread ending in two horns, which form the forked summit of the pistil. *See plate.*

Q. How are the florets of the centre constructed?

A. Each of these beautiful little florets, when expanded, has a corolla, shaped like the lily of the valley, with five stamens, which are united in the form of a tube, and surround a pistil, that passes through them, and is forked at the summit.* *See plate.*

Q. Describe the other parts of the daisy.

A. The whole of the florets are contained in a calyx composed of two rows of leaves, and stand upon a common receptacle, which is formed like a sugar-loaf; there is no seed-vessel, but the little oval seeds are placed immediately below the yellow florets, and when the latter fall off, remain attached to the receptacle.

Q. Are all the flowers of this class formed the same as the daisy?

* The minute beauties of these elegant little flowers, are best discovered with the aid of a magnifying glass. The daisy is sometimes doubly encircled with white florets, as represented in our plate, but it is more commonly seen with only one circlet.

A. All compound flowers bear a general resemblance to the daisy; but some have all their florets like those of the centre, as in the thistle; while in others the florets resemble those of the margin of the daisy, as the dandelion and sowthistle.*

Q. Are no native plants of this class cultivated in gardens?

A. Many ornamental and useful plants have been reclaimed from the field, where they originally grew wild; such are the common garden marygold, tansy, chamomile, and the elecampane, a medicinal plant, much esteemed for the aromatic bitterness of its root.

Q. What are the most remarkable exotics?

A. The common artichoke is of this class; and the vegetable commonly called the Jerusalem artichoke, which is the tuberous root of a species of sunflower, native of Brazil: it derives its name from a fancied resemblance in its flavor to that of the common artichoke, and a corruption of the word *girasole*, an Italian name for the sunflower.

CHAPTER XXVIII.

CLASS XX. GYNANDRIA.

Q. How are plants of the class Gynandria distinguished?

* The class syngenesia has five orders:

1. *Polygamia æqualis*, in which each floret is perfect, that is, furnished with stamens and a pistil; as dandelion and sowthistle.

2. *Polygamia superflua*, distinguished by the florets of the centre having perfect stamens and pistils, and those of the margin pistils only, as in the daisy.

3. *Polygamia frustranea*, having the florets of the centre

A. The flowers of plants in the twentieth class, are formed in a peculiar manner, by the stamens growing upon the pistil itself.

Q. Of what plants is it composed?

A. The class gynandria consists chiefly of those beautiful tribes of flowers, the orchis and ophrys, much sought after by gardeners and florists, on account of their singular structure.

Q. Are any of them found wild in England?

A. There are many species of orchis growing wild, which may be commonly met with: that called Orchis mascula, or early purple orchis, from its purple flowers, is found in woods and meadows, and is in blossom in April and May.

T. Give me a description of the plant.

P. The stalk rises about a foot in height, and is purplish towards the top; the leaves are long, and usually marked with dark-coloured spots; and the flowers terminate the stem in a long regular spike.

T. Describe the construction of the flower.

P. The corolla of the orchis is composed of five petals, two of which are upright, of an oval pointed shape, with their lips bent inwards, and the other three are placed above it, so as to form the helmet; the lip is large, and divided into three lobes; the nectary is lengthened out behind into a tube, resembling a little horn, and the germen is

perfect, but those of the margin destitute both of style and stamens; as in the sunflower and blue-bottle.

4. *Polygamia necessaria:* in this order the florets of the centre have stamens only, and those of the margin have pistils only; as in the garden marygold.

5. *Polygamia segregata,* comprehends such flowers as have tubular florets, all perfect, each floret having its own separate calyx, in addition to the general calyx which includes all the florets; as the globe-thistle.

oblong and twisted, with a short style and compressed summit.*

Q What other native specimens are there?

A. In this class may be also examined the lady's-slipper, the birthwort, and the curious arum, whose sheathed flower is succeeded by clusters of bright scarlet berries, which make a conspicuous appearance under the hedges where they commonly grow. Vanilla, the fruit of which is used to flavor chocolate, is a South American plant of this class.

CHAPTER XXIX.

CLASS XXI. MONŒCIA.

Q. What plants are in the twenty-first class?

A. The twenty-first class is composed of plants having stamens and pistils in separate flowers, but both growing on the same plant.

T. Mention some of the native plants.

P. The class Monœcia contains many curious and important trees and plants: among the latter, are the cucumber, melon, and others of the gourd tribe; the sedge, bullrush, arrowhead, and that formidable plant the stinging nettle.

Q. What are the native trees?

A. Some of our most valuable trees belong to this class; as the oak, the pine, beech, birch, hazel, box, and hornbeam.

* Gynandria contains seven orders:

1. *Monandria*, one stamen, contains the orchis tribe.
2. *Diandria*, two stamens, as in lady s-slipper.
3. *Triandria*, three stamens.
4. *Tetrandria*, four stamens.
5. *Pentandria*, five stamens.
6. *Hexandria*, six stamens, contains the very extraordinary genus of birthwort.
7. *Octandria*, eight stamens.

Q. What are the flowers of the oak?

A. In the oak tree the stamens are on a catkin, a sort of spike composed of many flowers; and the pistils in buds attached to the branches; the same may be seen in the hazel and beech trees.*

Q. For what is the oak remarkable?

A. The oak is remarkably long lived, and attains to a great size: it is the most important of British trees, uniting hardness with such a degree of toughness as not easily to splinter, wherefore it has long been justly preferred for the purpose of building ships.

Q. To what other uses is it applied?

A. The bark of the oak is universally used in the tanning of leather; and the acorns, are good for fattening hogs and deer: oak sawdust is the principal vegetable ingredient used in dying fustians, and all the different shades of drab and brown colour.

Q. What are the light spongy bodies, called oak-apples?

A. They are excrescences occasioned by little

* The twenty-first class has nine orders, which are also formed from the number of stamens:

1. *Monandria,* one stamen.
2. *Diandria,* two stamens, contains the willows.
3. *Triandria,* three stamens, the numerous tribe of sedges.
4. *Tetrandria,* four stamens, contains the nettle, the alder, box.
5. *Pentandria,* five stamens, contains the lesser burdock.
6. *Hexandria,* six stamens.
7. *Polyandria,* more than seven stamens, contains the oak, beech, hazel, hornbeam, &c. arrowhead, and arum or cuckoo-pint.
8. *Monadelphia,* the stamens united by their filaments into one set, contains the pine or fir trees.
9. *Polyadelphia,* the stamens united into more than two sets, as in the gourd tribe.

insects, which wound the surface in order to deposit their eggs· their proper name is galls; and those brought from the southern parts of Europe, are the principal substance used in making the ink that we write with.

Q. Is not cork obtained from a species of the oak?

A. The elastic substance called cork, so serviceable in stopping bottles, &c. is the outer bark of a species of oak growing in the South of Europe and North of Africa. The tree is not barked till it is fifteen years old; and the first bark is very inferior to that afterwards produced; it is understood that the removal of the bark is essential to the preservation of the tree.

Q. What name is given to the wood of the pine?

A. The wood of the Scotch pine, or fir, is very smooth and light, and called red deal; the common white deal is produced by the Norway pine.

Q. What useful substances are procured from these trees?

A. Pitch, turpentine, and resin, are obtained from the Norway pine; and the Scotch fir, when cut in pieces, and enclosed in a large oven, constructed for the purpose, with a channel at the bottom, yields the substance called tar.

Q. For what is box-wood used?

A. The box tree is an evergreen, rising to the height of 10 or 12 feet:* it is the slowest growing of all our native trees, which renders the wood hard, heavy, and of great value for making musi-

* The place where the box tree grows to this height, and in the greatest abundance, is Box-hill, in Surrey. There is a smaller variety, much used for making edging to gravel-walks in gardens.

cal and mathematical instruments, handles of tools, and the finer kinds of turnery ware.

Q. What are the most remarkable plants of foreign countries?

A. Among the foreign plants may be noticed the cedar of Lebanon, the mulberry and walnut trees, now common in England; the cocoa-nut tree, the bread-fruit tree, the Siphonia or Indian-rubber tree, the tallow tree, and the maize or Indian corn.

Q. Of what country is the mulberry tree a native?

A. The mulberry tree is a native of Italy, and is now cultivated in most parts of Europe, not only for the grateful fruit which it affords, but in many places for the more lucrative purpose of supplying silk-worms with its leaves, upon which they feed.

Q. For what is the wood of the walnut tree chiefly used?

A. The wood of the walnut is of a dark colour, beautifully variegated, and being hard enough to admit of polishing, is generally used for making gun-stocks: it was also much used by cabinet makers, before the introduction of mahogany.

T. Describe the cocoa-nut tree.

P. The cocoa-nut tree is a native of the East Indies, and attains to the height of 60 feet: it makes a very grand appearance, the tops of the stems being crowned with tufts of leaves from 10 to 15 feet long, and bearing clusters of large nuts, containing within the kernel a refreshing juice, very refreshing in hot countries.

Q. What is the bread-fruit tree?

A. The bread-fruit tree bears fruit about the size of a child's head, which supplies the inhabitants of the South Sea islands with abundance

of wholesome food duri ig the greater part of the year: they also clothe themselves with cloth made of the bark; and the wood serves for building their huts and canoes.

Q. How is Indian rubber procured?

A. Indian rubber, or caoutchouc, is an elastic resin, that oozes out in the form of a vegetable milk, from incisions made in trees growing in the East and West Indies, Brasil, and China; it thickens and hardens gradually on exposure to the air; and, although it usually comes to us in the shape of little bottles, may be made into any other form, by covering moulds of clay with the liquid juice.*

Q. What is maize?

A. Maize, or Indian corn, is a very valuable American plant, cultivated in many countries for the sake of its seed, which, when ground, produces more flour than any other kind of corn: the stalk is jointed like the sugar cane, and bears large ears, upon which the grains are fixed in naked rows. There have been some late and successful attempts to cultivate this corn in England.

Q. Is not the Upas tree in this class?

A. It is: this tree, called the poison tree of Java, of which so many fables have been told by travellers and poets, leading many persons to

* The American Indians make boots with it, which water cannot penetrate, and which, when smoked, have the appearance of real leather. Torches are made of it, which give a beautiful light, without any disagreeable smell; and the inhabitants of Quito prepare from it a kind of cloth, which they apply to the same purpose as our oil-cloth. In this country, its chief use has been for rubbing out black-lead pencil marks; but of late it has been applied to many other purposes, and promises to become an important article of commerce.

doubt whether its very existence were not a fiction, is now known among botanists by the name of *Antiaris toxicaria.* Its juices contain a powerful poison, but the supposed power of infecting the air in its neighbourhood, &c. must be numbered among those tales worthy rather of poetical than historical credence.

CHAPTER XXX.

CLASS XXII. DIŒCIA.

Q. What plants constitute the twenty-second class, Diœcia?

A. The twenty-second class has the plants of which the stamens and pistils are in separate flowers, situated on two separate plants; as may be seen in the yew, which possesses the best flowers to illustrate this class.*

Q. What native plants does it contain?

A. In the list of native plants may be noticed the juniper, butcher's broom, miseltoe, and the willow and poplar trees.

Q. For what is the hop used?

A. The hop is cultivated for giving an agreeable

* This class has eight orders:

1. *Monandria,* one stamen.
2. *Diandria,* two stamens.
3. *Triandria,* three stamens, as in the crowberry.
4. *Tetrandria,* four stamens, contains the miseltoe, and gale, or Dutch myrtle.
5. *Pentandria,* five stamens, as the hop, hemp, and spinach.
6. *Hexandria,* six stamens, contains black briony.
7. *Polyandria,* many stamens, as in the poplar.
8. *Monadelphia,* the stamens united into one set, contains he juniper and the yew.

bitter to malt liquor: the part used is a sort of catkin, which contains the flowers that have pistils.

Q. What is the juniper?

A. Juniper is an evergreen prickly shrub, growing in several heathy parts of England, from whose berries the well-known spirituous liquor called gin was originally prepared; but English gin is now understood to be more indebted to turpentine than to juniper-berries.

Q. What is remarkable of the miseltoe?

A. The miseltoe is a parasitical evergreen shrub commonly growing on apple, oak, and other trees, and retaining its pellucid berries throughout the winter: it will not take root in the ground, but if the ripe berries be rubbed into the apertures of the bark of almost any tree, they will produce plants the following winter.

Q. What are the most remarkable foreign plants?

A. The principal exotics of this class, are the weeping-willow, so ornamental to pieces of water; spinach; hemp; the pistachia-nut tree, which grows in the Levant, and produces the agreeable fruit of that name; the nutmeg tree; the pitcher plant; and the date-palm.

Q. For what is hemp employed?

A. Hemp,* which is cultivated in Suffolk and other parts of England, is a native of the warm climate of India; ropes and sail-cloth are made

* Hemp is sown in March, and is fit for harvest in October; it is then pulled up, and soaked in water, for the purpose of separating the tough rind or outer coating from the woody parts of the stalk: after it has been combed, dried, and reduced to different degrees of fineness, it is spun for various purposes.

of it; and the seed is useful for feeding birds and poultry.

Q. Of what country is the nutmeg a native?

A. It is an East-Indian tree, about thirty feet high, with smooth oblong leaves; it produces an oval or globular fruit, of which the nutmeg is the seed, and the spice called mace, the arillus or cover. Although the fruit is nine months in ripening, it produces three gatherings annually: the first and best in April, the second in August, and the third in December.

Q. What is remarkable of the pitcher-plant?

A. The peculiar form of the leaves; the extremities of which are formed like a little pitcher, are usually filled with water, and covered with a lid.

Q. Where does the date-palm grow?

A. It is a native of the Levant: a lofty tree with very large leaves, bearing the fruit called dates, in clusters which have been compared to the fingers of the human hand. This fruit is an important article of diet, and every part of the tree is applicable to some useful purpose.

CHAPTER XXXI.

CLASS XXIII. POLYGAMIA.

Q. How is the twenty-third class distinguished?

A. The character of the class Polygamia, consists in having some flowers with stamens only, others with pistils only, and some with all their parts perfect; and these are placed either on the same plant, or on two or three different ones

Q. What plant will serve to exemplify the class?

A. These distinctions may be seen in the ash, which bears perfect flowers only on one tree, and flowers with pistils only on others; each sort of blossom, however, is usually accompanied by some few of the other.

Q. What other indigenous plants are there?

A. The only native plant is the atriplex or orache, a curious genus, of which most of the species grow by the sea-side. The leaves have usually a white powdery appearance, and the flowers, which are very minute, seldom produce seed. Some other British plants were formerly placed in this class, from an occasional imperfection of the blossoms; which, upon better knowledge, have been removed.*

Q. Mention some of the exotics.

A. Among the most interesting are the common fig tree, the banyan tree, the acacia, and the sensitive plant.

Q. What is remarkable of the fig tree?

A. The fig tree has no apparent flower, but the fruit, in its early stage, has the inner surface covered with little florets, which can only be discovered by opening it: it is a native of the South of Europe, but will ripen its fruit in England, if screened from the north-east wind.

Q. What is particularly worthy of note in the banyan tree?

A. The banyan or Indian fig tree grows about

* The twenty-third class, Polygamia, has three orders:

1. *Monœcia*, having perfect flowers, accompanied with barren or fertile flowers, or both, all on the same; as in orache.

2. *Diœcia*, having the different flowers on two separate plants.

3. *Triœcia*, the same on three separate plants.

30 feet high, with many spreading branches, of which the ends turn downwards, and take root in the soil; so forming a number of stems, each giving out branches; until one individual tree has the aspect of a little forest, or a temple of natural colonnades.* It is called the Priest's tree, and held in great veneration by the Gentoos.

Q. What is the acacia?

A. Acacia is the name of a large genus comprising many curious and many beautiful species; that called the true acacia, *Acacia vera*, is an African tree from which gum arabic exudes in a liquid state, in a similar manner to the gum that is often produced upon the cherry and other trees in this country; and, by exposure to the air, it soon acquires solidity and hardness. Another species of Acacia, growing in the East Indies, furnishes the catechu of the druggists.

Q. What are the peculiarities of the sensitive plant?

A. The sensitive plant and the humble plant, two species of Mimosa frequently confounded under the former appellation are remarkable for contracting or dropping their leaves and branches when touched; they are natives of Brazil.

* See Milton's description of this tree, in the Paradise Lost.

CHAPTER XXXII.

CLASS XXIV. CRYPTOGAMIA.

Q. What is the character of the concluding class of the Linnæan system?

A. The class Cryptogamia, comprehends all plants whose flowers are either imperfectly or not at all known, or not capable of being numbered with any precision.

Q. What are these plants?*

A. The cryptogamous plants are ferns, mosses, liverworts, flags, lichens, and fungi.

Q. What are ferns?

A. Ferns are well-known plants growing about the borders of woods, near rivulets, and in stony rocky places, distinguished by the form of their leaves, which are shaped like the end of a lance, and divided into a great number of lobes or second leaves.

Q. Do they not produce any flowers?

A. What is called the fructification of ferns, is generally disposed in spots, or parallel lines at the back of the leaf; as may be seen in the common brake and spleenwort, found on old walls, stumps and roots of trees, and shady places.

Q. What is remarkable of mosses?

A. Mosses, interesting little evergreens, are really herbs with distinct leaves, and frequently as distinct a stem: they are found in the hottest and coldest climates, and have the singular property

* The orders of the twenty-fourth class are natural orders or families; 1, *Filices*, or ferns; 2, *Musci*, or mosses; 3, *Hepaticæ*, or liverworts; 4, *Algæ*, or flags; 5, *Lichens*; and 6, *Fungi*.

of reviving with moisture, however much dried up.

Q. What are Liverworts?

A. Liverworts are plants of cellular substance, forming a link between the mosses and the flags, and partaking of the characters of both. They are chiefly found in moist places, but are never submersed.

Q. What plants are included under the term *algæ*, or flags?

A. The algæ are aquatic plants, which derive their nourishment by their surface, being either fixed by their roots to stones or rocks, or floating about without being attached to any thing.

Q. What are Lichens?

A. Lichens are fleshy or leather-like substances, growing on rocks, trees, and old buildings; the most common species may be observed in the form of a rough yellow and bluish crust, on gooseberry-bushes, and old park-palings, to which they im part a picturesque appearance.

Q. Are they applied to any useful purpose?

A. The fine purple colour called orchil, is extracted from a valuable species of lichen, found in the Archipelago; and several other kinds afford beautiful dyes: the rein-deer lichen grows in Lapland to the height of a foot, and is the principal food of the useful animal whose name it bears.*

T Describe the fungi.

* This animal resembles the stag, and is admirably suited by Providence to the frozen regions of the north, where the inhabitants could not exist without it. It answers the purpose of a horse, by drawing them in sledges over regions covered with snow: its flesh and milk afford them food; its skin, clothing; and its bones, sinews, and intestines, are converted into many useful articles.

P. The fungi are a singular tribe of plants, without branches, leaves, or flowers, and having scarcely any root: they are generally of quick growth, and short duration.

Q. Mention some of the vegetables belonging to this order.

A. In the fungi are included the large family of mushrooms; morels; truffles; the mould of cheese; dry rot, &c.

Q. Are not some mushrooms poisonous?

A. Many of them are poisonous, many nauseous, others insipid, and a great number eatable, and much esteemed. As many of the species are very similar in general appearance, they should not be eaten incautiously. The species most commonly eaten, and the only one cultivated in this country, is the *Agaricus campestris*, which grows wild in parks and meadows: when it first appears above the earth it is white, smooth, and globular; in expanding, it discovers a white stem, covered with a sort of cap, beneath which are flat thin substances disposed edgewise, called gills; of a pink hue when young, but afterwards of a dark liver colour. At a little distance below the cap, the stem is girdled with a thin white cobweb-like ring, called the veil. *See plate, fig.* 24.

APPENDIX.

ON THE FORMATION OF AN HERBARIUM, OR HORTUS SICCUS.

The description and figure of plants, however amply and correctly they may be given in books, can be neither so instructive nor so satisfactory to the young student in botany, as when he has the works of nature before him, and can examine and investigate for himself, without danger of being misled by the errors or misconceptions of others. It will be proper, therefore, to give a few directions, by which the plants that he has examined, may be preserved, and formed into a collection for occasional reference.

Several methods have been recommended for preserving plants, but the best appears to be that of drying them. Most plants dry with facility between the leaves of books or other paper; and a collection of bound newspapers will be found well adapted to the purpose. If there be plenty of paper, they often dry best without shifting; but, if the specimens be crowded, they must be taken out frequently, and the paper dried before they are replaced. Some vegetables are so tenacious of the vital principle, that they will grow between papers: but that inclination must be prevented by immersion in boiling water, or by the application of a hot iron, such as is used for linen, after which they are easily dried.

In spreading the plants between papers, too much nicety and precision should not be observed

in arranging their leaves and branches, in order to give them a picturesque appearance, as it takes away from their natural aspect; except, however, for the purpose of displaying the internal parts of one or two of the flowers, for ready observation. When properly dried, the specimens are best preserved by being fastened with weak carpenter's glue, to detached sheets of paper, or in a blank book, with the name, the time, and place of finding, or any other concise piece of information, written on the opposite leaf. When the book is full, an alphabetical index may be made to the page. The herbarium thus formed, will be found to keep best in a dry room without a constant fire.

Specimens should be gathered on a dry day, and carried home in a japanned tin box, in which they will keep for several days better than in water, should any thing occur to prevent their immediate use. If the stem be woody, it may be thinned with a knife; and, when the flower is thick or globular, as the thistle, one side of it may be carefully cut away, it being only necessary, in a specimen, to preserve the character of the class, order, genus, and species.

By this means the productions of our own, or of the most distant countries, may be brought together under our eyes at any season of the year; and, in the midst of winter, our minds may be regaled with a semblance of spring, while the still verdant specimens will bring to our recollection the many pleasant excursions undertaken to procure them.

Adlard, Printer, Bartholomew Close.